REMARKS

The Invention

The application discloses methods and kits for isolating nucleic acids from a sample. The methods use a solid support that includes an organic polymer, and the nucleic acid is bound to the support in the presence of a detergent and in the absence of any chaotropic agent.

The Office Action

The Examiner has withdrawn the rejection of claims 1-4, 9-11, 13, 16-18, 20-24 as being anticipated under 35 USC 102(e) by Cros et al., US Patent No. 5, 510, 084 (referred to herein as "the Cros patent"). The Examiner has also withdrawn the rejection of claims 5 and 24 under 35 USC 112(2).

The rejection of claims 1-24 (as well as claim 25 added in Applicants' Amendment of April 16, 2001) under 35 U.S.C. §103(a) over the Cros patent, in combination with the 1994 Pharmacia Technology Products Catalog ("the Pharmacia catalog") has been maintained. Claim 26, which was added in the Amendment of April 16, 2001, has been rejected as being anticipated under 35 USC 102(e) by Hawkins, US Patent No. 5,898,071 ("the Hawkins patent").

Amendments to the Claims

Upon entry of this amendment, claims 1, 5-17, 19-25, and 27-34 will be pending in the present application. Claims 2, 3, 4, 18, and 26 have been canceled, claims 1, 14-16, and 24 amended, and new claims 27-34 added by the above amendments. No new subject matter has been added.

Claims 1, 14, 15, and 24 have been amended to be directed to a method of isolating genomic DNA, instead of a "nucleic acid," from a sample using a detergent and a solid support in the absence of a chaotropic agent, wherein the binding of the genomic DNA to the solid support is sequence-independent. Thus, claim 1, as amended, requires, *inter alia*, the limitation of sequence-independent binding (this limitation was introduced as claim 26 in the Amendment filed on April 16, 2001). Support for the amendments to claim 1 can be found, e.g., on page 5, lines 21-22, and in the last paragraph of the same page.

Claims 2, 3, and 26 have been canceled in view of the amendments to the claims made herein.

Because claim 1 has been amended to recite "a method of isolating genomic DNA," its dependent claim 4 (reciting an additional RNA isolation step) has been canceled and rewritten as new independent claim 28.

Claim 16 has been amended to recite "a kit for isolating genomic DNA." Claim 16 has further been amended to recite superparamagnetic polystyrene beads, as described, e.g., in the specification at page 11, line 1. Claim 27 has been added to recite a kit that includes instructions for carrying out the method of claim 1.

Because claim 16 has been amended to recite "a kit for isolating genomic DNA," its dependent claim 18 (reciting an additional means for isolating RNA) has been canceled and rewritten as new claim 29 that depends from claim 28. Claim 29 recites superparamagnetic polystyrene beads and oligo dT beads, as described, e.g., in the specification at page 11, line 1; page 14, line 29; and page 35, line 16. Claim 30 has been added to recite a kit that includes instructions for carrying out the method of claim 28.

Claim 31 has been added to recite an additional step of obtaining cells by immunomagnetic separation, as described in the specification at page 22, lines 6-13. Claim 31 also recites an additional step of producing a lysate, as described in the specification at page 22, lines 13-17.

Claim 33 has been added to recite the subject matter of claim 31 with an additional step to isolate RNA.

Claims 32 and 34 have been added to recite cell:bead complexes, as described in the specification at page 22, lines 12-17.

In view of the claim amendments made herein and the following remarks, Applicants respectfully submit that the present application is in condition for allowance.

Rejection of Claim 26 under 35 USC 102(e)

On pages 2-3 of the Final Office Action mailed on July 18, 2001, the Examiner has rejected claims 26 as being anticipated by Hawkins, US Patent No. 5,898,071.

Claim 26 has been canceled, thereby rendering this aspect of the rejection moot. Applicants respectfully traverse this rejection as applied to any of the presently pending claims, all of which are now directed to methods and kits for isolating genomic DNA (or in some claims, RNA and genomic DNA) from a sample. The Hawkins patent is not concerned with the isolation of genomic DNA. Instead, the methods disclosed in that patent concern the isolation of plasmids, cosmids and cloned DNA, or fragments thereof (see, e.g., the Examples in that document). The utility of the Hawkins method is described in general terms as simplifying the isolation of cloned DNA: see, e.g., column 2, lines 2-12. The Hawkins patent at column 4, lines 42-47, discloses preparation of a "cleared lysate" containing plasmid DNA intended for further isolation. This "cleared lysate" is produced by removing unwanted contaminants such as chromosomal (i.e., genomic) DNA. Because the Hawkins patent does not disclose methods for isolation of genomic DNA, Applicants submit that the claims, as amended, are novel in view of the Hawkins patent.

The present invention is completely different from the method disclosed in the Hawkins patent. The Hawkins method utilizes a multi-step process involving lysis of cells containing the nucleic acid, followed by a precipitation step, e.g., potassium acetate (KOAc) precipitation, and a centrifugation step (see column 4, lines 38-58 and Examples 1-4 of the Hawkins patent) just to remove the genomic DNA from the desired plasmid DNA. These steps leave free nucleic acid molecules, such as plasmids, in solution. The free nucleic acid molecules are then contacted, e.g., bound to a solid support, in the presence of PEG and salt. PEG is known to precipitate plasmid DNA, and is presumably the underlying process that allows binding of the plasmid DNA onto the solid support.

In contrast, the present invention provides what can be a one-step method of isolating genomic DNA. The method utilizes a contacting step that combines cell lysis and binding to a solid support. There is no need to clear a lysate by conventional precipitation and centrifugation methods. No precipitation step is required either to remove an undesirable portion or to concentrate the desired molecules. All the required reagents may be added in a single step; the DNA attached to the solid support may then simply be removed from the mixture. Indeed, the advantage of the present method is that such steps as used in the prior art may be avoided. The method in the claims, as presently pending, thus allows the rapid isolation of genomic DNA,

without the need for multiple steps. Such method is not disclosed in the Hawkins patent, and the present method thus moves beyond the quite technically specific, limited method of that patent.

In view of the foregoing claim amendments and arguments, reconsideration and withdrawal of this rejection is respectfully requested.

Rejection of Claims 1-25 under 35 U.S.C. 103(a)

On pages 3-4 of the Final Office Action, the Examiner has maintained the rejection of claims 1-24 (and newly rejects newly added claim 25) under 35 U.S.C. 103(a) as being obvious over the Cros patent and the Pharmacia catalog for the reasons already of record.

This rejection has been met by amending the pending claims to incorporate the limitation of claim 26, now canceled, requiring the binding of the genomic DNA to be sequence-independent. Thus, the pending claims are directed to a method of isolating genomic DNA from a sample using a detergent and a solid support in the absence of a chaotropic agent, wherein the binding of the genomic DNA to the solid support is sequence-independent.

Both the Cros patent and the Pharmacia catalog disclose sequence-specific binding to the solid support, i.e., binding to oligo(dT) or oligo(dA), or to a particular immobilized oligonucleotide, respectively. The oligodeoxynucleotide celluloses of Pharmacia are used for affinity isolation by virtue of specific interactions between complementary bases of the target and capture entities.

In contrast, the claimed invention is directed to sequence-independent binding of a genomic DNA sequence to the solid support. The Pharmacia catalog and the Cros patent are not concerned with, nor suggestive of, the claimed method in which sequence-independent binding occurs. The cited references fail to disclose or suggest modifying the Pharmacia or Cros sequence-dependent method by including detergent, avoiding use of a chaotropic agent, and binding in a sequence-independent manner. Nor does either reference suggest a reason that sequence-independent binding might be desirable.

In view of the foregoing, reconsideration and withdrawal of the rejection is respectfully requested.

SUMMARY

The present claims are in condition for allowance.

Amendment and cancellation of these claims should not be construed as an acquiescence to the Examiner's rejection. These amendments are being made solely for the purpose of expediting prosecution of the above-identified application. Applicant reserves the right to pursue the claims in this application or another application.

If a telephone conversation with Applicants' Attorney would expedite the prosecution of the above-identified application, the Examiner is urged to call Applicants' Attorney at (617) 542-5070.

Attached is a marked-up version of the changes being made by the current amendment.

Enclosed is a $1960 check for the Petition for Extension of Time fee. Please apply any additional charges or credits to Deposit Account No. 06-1050, referencing attorney docket number 08269-003001.

Respectfully submitted,

Date: August 16, 2002

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Version with markings to show changes made

In the claims:

1. (Amended) A method of isolating genomic DNA [nucleic acid] from a sample, said method comprising (a) contacting said sample with a detergent and a solid support in the absence of any chaotropic agent, the solid support comprising an organic polymer, whereby soluble genomic DNA [nucleic acid] in said sample is bound to the support in a sequence-independent manner in the presence of the detergent and absence of any chaotropic agent, and (b) separating said support with bound genomic DNA [nucleic acid] from the sample.

14. (Amended) A method as claimed in claim 1, wherein the genomic DNA [nucleic acid] is eluted from the support, following separation from the sample.

15. (Amended) A method as claimed in claim 14, wherein the genomic DNA [nucleic acid] is eluted by heating.

16. (Amended) A kit for isolating genomic DNA [nucleic acid] from a sample, the kit comprising superparamagnetic polystyrene beads [a solid support] and one or more detergents [as defined in claim 1].

24. (Amended) A method as claimed in claim 1, the method further comprising the step of detecting, hybridizing, amplifying or quantifying the bound genomic DNA [nucleic acid] after the separating step.

Appendix

Amended Claims:

1. (Amended) A method of isolating genomic DNA from a sample, said method comprising (a) contacting said sample with a detergent and a solid support in the absence of any chaotropic agent, the solid support comprising an organic polymer, whereby soluble genomic DNA in said sample is bound to the support in a sequence-independent manner in the presence of the detergent and absence of any chaotropic agent, and (b) separating said support with bound genomic DNA from the sample.

[4. (Canceled) A method as claimed in claim 1, further comprising an additional step to isolate RNA from the sample.]

5. (Reiterated) A method as claimed in claim 1, further comprising disrupting or lysing structural components or cells in the sample prior to the contacting step.

6. (Reiterated) A method as claimed in claim 1, wherein the detergent is anionic.

7. (Reiterated) A method as claimed in claim 6, wherein the detergent is sodium dodecyl sulphate, or another alkali metal alkylsulphate salt, or sarkosyl.

8. (Reiterated) A method as claimed in claim 1, wherein the concentration of detergent is 0.2 to 30% (w/v).

9. (Reiterated) A method as claimed in claim 1, wherein the detergent is contained in a composition additionally comprising one or more monovalent cations, chelating agents or reducing agents.

10. (Reiterated) A method as claimed in claim 1, wherein the detergent is used in alkaline solution.

11. (Reiterated) A method as claimed in claim 1, wherein the solid support is particulate.

12. (Reiterated) A method as claimed in claim 11, wherein the solid support comprises magnetic beads.

13. (Reiterated) A method as claimed in claim 1, wherein the solid support has a hydrophobic surface.

14. (Amended) A method as claimed in claim 1, wherein the genomic DNA is eluted from the support, following separation from the sample.

15. (Amended) A method as claimed in claim 14, wherein the genomic DNA is eluted by heating.

16. (Amended) A kit for isolating genomic DNA from a sample, the kit comprising superparamagnetic polystyrene beads and one or more detergents.

17. (Reiterated) A kit as claimed in claim 16, further comprising one or more buffers, salts, lysis agents, chelating agents and/or reducing agents.

[18. (Canceled) A kit as claimed in claim 16, further comprising means for isolating RNA.]

19. (Reiterated) A method as claimed in claim 1, wherein the organic polymer is polyurethane.

20. (Reiterated) A method as claimed in claim 1, wherein the organic polymer is polystyrene.

21. (Reiterated) A method as claimed in claim 1, wherein the organic polymer is latex.

22. (Reiterated) A method as claimed in claim 1, wherein the solid support comprises superparamagnetic polystyrene beads.

23. (Reiterated) A method as claimed in claim 1, wherein the solid support is porous.

24. (Amended) A method as claimed in claim 1, the method further comprising the step of detecting, hybridizing, amplifying or quantifying the bound genomic DNA after the separating step.

25. (Reiterated) The method of claim 5, wherein the disrupting step is effected by one or more of grinding, heating, or alkaline lysis, of the sample.

27. (New) A kit for isolating genomic DNA from a sample, the kit comprising (a) a solid support as defined in claim 1; (b) one or more detergents; and (c) instructions for isolating genomic DNA according to the method of claim 1.

28. (New) A method of isolating RNA and genomic DNA from a sample, said method comprising (a) contacting said sample with a detergent and a solid support in the absence of any chaotropic agent, the solid support comprising an organic polymer, whereby soluble genomic DNA in said sample is bound to the support in a sequence-independent manner in the presence of the detergent and absence of any chaotropic agent; (b) separating said support with bound genomic DNA from the sample; and (c) isolating RNA from said sample.

29. (New) A kit for isolating RNA and genomic DNA from a sample, the kit comprising (a) superparamagnetic polystyrene beads; (b) oligo dT beads; and (c) one or more detergents.

30. (New) A kit for isolating RNA and genomic DNA from a sample, the kit comprising (a) a solid support comprising an organic polymer; (b) one or more detergents; and (c) instructions for isolating RNA and genomic DNA according to the method of claim 28.

31. (New) A method of isolating genomic DNA from cells in a sample, said method comprising (a) obtaining cells from said sample by immunomagnetic separation; (b) producing a lysate by contacting said cells with a detergent and a solid support in the absence of any chaotropic agent, the solid support comprising an organic polymer, whereby soluble genomic DNA in said lysate is bound to the support in a sequence-independent manner in the presence of the detergent and absence of any chaotropic agent; and (c) separating said support with bound genomic DNA from said lysate.

32. (New) A method as claimed in claim 31, wherein said cells are in a cell:bead complex.

33. (New) A method of isolating RNA and genomic DNA from cells in a sample, said method comprising (a) obtaining cells from said sample by immunomagnetic separation; (b) producing a lysate by contacting said cells with a detergent and a solid support in the absence of any chaotropic agent, the solid support comprising an organic polymer, whereby soluble genomic DNA in said lysate is bound to the support in a sequence-independent manner in the presence of the detergent and absence of any chaotropic agent; (c) separating said support with bound genomic DNA from said lysate; and (d) isolating RNA from said lysate.

34. (New) A method as claimed in claim 33, wherein said cells are in a cell:bead complex.